



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7

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MAY 07 2015

Ms. Wendy Vit
Chief, Operations Section
Missouri Department of Natural Resources
Air Pollution Control Program
1659 East Elm Street
Jefferson City, MO 65101

Dear Ms. Vit:

We appreciate the opportunity to provide written comments on the following proposed rulemaking and plan:

- MDNR's draft plan for the Jefferson County, Missouri 2012 1-hour sulfur dioxide (SO₂) National Ambient Air Quality Standard (NAAQS) nonattainment area

EPA Region 7 is providing written comments in response to MDNR's draft plan for the Jefferson County, Missouri 2010 1-hour sulfur dioxide (SO₂) National Ambient Air Quality Standard (NAAQS) nonattainment area. Our review of the plan is based on EPA's applicable laws, regulations, and SO₂ attainment plan guidance. We have identified several instances in which the State's analysis does not follow EPA's April 23, 2014 Guidance for 1-hour SO₂ Nonattainment Area SIP Submissions. Of key concern is that the current analysis performed and submitted by MDNR does not appear to ensure that the entire area within the nonattainment area boundary will attain the standard. In addition we have concerns about the appropriateness of the emissions rates used in the air quality modeling, and the substantial absence of meteorological data in the meteorological analysis performed by the state to support the plan. We are committed to working with MDNR to address the issues we have identified in the draft nonattainment plan to ensure the State's plan is protective of public health in Jefferson County. The following information details specific issues and recommendations we have concerning the draft nonattainment area plan.

Modeling: Documentation and/or Rationale

Section 4 of the Jefferson County Sulfur Dioxide Nonattainment SIP provides information regarding the air modeling demonstration conducted by MDNR. EPA has several comments related to this portion of the SIP.

- Section 4.3 "Sources outside the NAA", MDNR includes the following statement: "Sources with an impact on the nonattainment area were explicitly included in the modeling analysis." The term "impact" is not defined, so it is unclear which sources may have been excluded. In addition, MDNR used actual SO₂ emissions to determine "impact" which may not represent emissions in future years. Finally, the inventory year of emission data used for this analysis is not specified and should be clearly provided in the state's demonstration.



- Section 4.6, regarding the meteorological data used in the AERMOD modeling, EPA identified several issues.
 - First, in this section, MDNR notes that onsite data was selected as the representative meteorological data based on its proximity to the violating monitor. MDNR provided a discussion on a measured data collected and noted that data completeness is above 90%. MDNR should provide some additional information in this section or in an Appendix, which includes the actual quarterly data completeness, whether the data was collected under an approved QAPP, and whether quality assurance procedures and audits were followed.
 - Secondly, EPA recommends the SIP language be strengthened by MDNR providing additional information and rationale as to why an onsite meteorological dataset is more representative of the entire nonattainment area than National Weather Service data. EPA notes that National Weather Service data is available for the emissions period used in the modeling.
 - Thirdly in Section 4.6, MDNR states no National Weather Service substitutions were needed because they used the Bulk Richardson Number Scheme. During review of the modeling, EPA found that over 50% of the meteorological data was flagged as missing. EPA guidance, titled “Meteorological Monitoring Guidance for Regulatory Modeling Applications”, (also located at the following website <http://www.epa.gov/scram001/guidance/met/mmgrna.pdf> and is reference 92 in 40 CFR Part 51 Appendix W), specifies a certain level of data completeness for regulatory use. Section 5.3.2 specifies a 90% completeness requirement stating:

“Applicants in regulatory modeling analyses are allowed to substitute for up to 10 percent of the data; conversely, the meteorological data base must be 90 percent complete (before substitution) in order to be acceptable for use in regulatory dispersion modeling.”

In this case, MDNR was using onsite meteorological data collected for Doe Run, and it appears that this dataset had some missing cloud cover which is a parameter used in the algorithm for calculating heat flux which in turn is used in determining mixing heights and dispersion (i.e. it is potentially important if these parameters are not calculated.) The other option for calculating heat flux is the Bulk Richardson Number Scheme. It appears to EPA that this meteorological data was flagged as missing because the Bulk Richardson Number Scheme was not implemented in AERMET and cloud cover was also not available. This lack of data completeness is a serious error that likely impacts the modeled design values. This meteorological dataset must be corrected and meet the completeness requirement in order to use this data in regulatory modeling such as a SIP attainment demonstration. MDNR states that two meter winds were not representative, but did not include an explanation of how or why this determination was made. EPA recommends that MDNR provide documentation supporting how this determination was made ensure that proper procedures for replacing missing data are followed.

- Section 4.9 “Background Concentration” MDNR calculated the background concentration based on a sector-based analysis of a monitoring site in East St. Louis. While the approach makes sense for the monitor used, it is not clear if the background here at this site is actually representative of the entire nonattainment area which is a different location. For example, Jefferson County is south of the monitor being used for background and based on the sector analysis MDNR performed this monitor is clearly seeing impacts from sources from many varying wind sectors. EPA does not have sufficient information to determine whether all these various sources in sectors being excluded are also being explicitly modeled in the NAA demonstration. Similarly, if the sources are not included, it is not clear if the background values should be higher. EPA also noted that the sector chosen (east winds) also rarely has winds from this direction. To address these issues, specifically if the background value is appropriate, EPA recommends that the latest monitoring data period without the impact from SO₂ emissions from Herculaneum should be further analyzed to determine if the 9ppb background is reasonable for the entire area. EPA also recommends performing back trajectories on the highest monitored days after Herculaneum shut down to determine the direction from where the higher readings are coming.
- In addition to the specific comments on the modeling analysis, EPA notes Appendix 2 of SIP includes the AmerenUE Consent Agreement. This agreement discusses a model performance analysis. EPA recommends any performance analysis follow recommended EPA procedures such as “Cox, W., and J. Tikvart, 1990: A statistical procedure for determining the best performing air quality simulation model. Atmos. Environ., 24A, 2387–2395.” EPA also notes that performing an accuracy assessment paired in time and space for a steady state model such as AERMOD is likely not appropriate. For regulatory modeling, the main concern is predicting the magnitude of the highest concentrations. While the analysis in Appendix 2 b(ii) can be performed, EPA would not recommend relying on this type of analysis for a steady state model. The use of beta options or other non-default options is an alternative technique and must be approved by the EPA regional office for use in regulatory applications. Appendix W Section 3.2.2 specifically states:

“Determination of acceptability of a model is a Regional Office responsibility. Where the Regional Administrator finds that an alternative model is more appropriate than a preferred model, that model may be used subject to the recommendations of this subsection. This finding will normally result from a determination that (1) a preferred air quality model is not appropriate for the particular application; or (2) a more appropriate model or analytical procedure is available and applicable.”

While EPA encourages the collection of additional data for performance evaluations, we also want to be clear that use of alternative techniques for regulatory purposes must be coordinated through EPA.

Monitor-Centric Analysis

Section 5 of the Jefferson County Sulfur Dioxide Nonattainment SIP provides information regarding the modeling scenarios considered by MDNR. MDNR conducted a “monitor centric”

analysis to resolve SO₂ exceedances in the Jefferson County nonattainment area that only analyzes impacts at those specific receptors, but does not demonstrate that receptors within the remaining nonattainment area will attain the standard. This narrow focus results in 1-hour SO₂ emission limitations at a number of AmerenUE power plants that may not be protective of other receptors in the nonattainment area. This concern, in addition to other factors described in these comments, suggest that MDNR may be under-estimating the potential impacts of AmerenUE sources, as well as other sources of SO₂ in and around the Jefferson County nonattainment area that might cause violations of the standard in the nonattainment area.

- Section 5.1b, MDNR performed “a monitor centric run” that uses allowable emissions for all facilities including the EGU sources. In this run a small limited set of receptors around the design value monitor is evaluated for compliance and MDNR’s analysis has modeled values for this area just under the standard. The rates in this run for the three Ameren sources are those rates which are considered the worst case hourly rates that are then used in a variability analysis to establish 24 hour block limits that become limits in the Consent Agreement between AmerenUE and MDNR. The approach used in this section would be acceptable if all nonattainment area receptors were included in the analysis, and all receptors were shown to comply with the NAAQS. However, in the MDNR analysis the majority of the nonattainment area receptors are not analyzed, and this approach clearly does not comply with EPA modeling guidance for nonattainment areas.
- Section 5.1bii, MDNR performs a monitor centric modeling run with actual emissions for all sources and compares results with the current monitored values. MDNR notes that the model is conservative because it over predicts what is currently being monitored. Also in this section, MDNR points out that the emissions and meteorological data are from different periods. EPA believes that direct comparisons of model performance or conservatism between the model and monitor should not be made unless MDNR can establish that it is appropriate to use emissions and meteorological data from differing periods.

AmerenUE Consent Agreement

Due to MDNR’s reliance in the attainment plan on “other” control measures at the three Ameren Missouri Energy Center facilities (a.k.a. AmernUE facilities) detailed in a 2015 Consent Agreement between AmerenUE and MDNR, we compared the limitations in the agreement to the historical operations of the these facilities and identified the following concerns.

MDNR’s modeling demonstration supporting the attainment plan relies on actual, hourly data from the AmerenUE power plants, but uses a three year period that isn’t representative of historical or future emissions from the plants. For example, in the table below, MDNR relied on data sets when emissions were significantly lower than the historical operations at the Labadie, Meramec and Rush Island plants. Because MDNR has not established emission limits in the draft plan that correspond with the actual hourly rates used in the modeling in the draft plan, the AmerenUE facilities could revert back to their historical operations and increase emissions of SO₂.

If the state chooses to establish 24-hour limits for these plants, the plants could become authorized to emit at levels higher than the plants historically emitted over the last 10 years. For example, at a capacity factor of 85 percent and at the rates described in the Consent Agreement, Labadie, Meramec and Rush Island could emit up to levels described in the table below. Such emissions levels would occur at multiples of 1.3 to 2.4 times the historic 10-year highs and 2.2 to 3.2 times the level of emissions that MDNR modeled in its demonstration.

Plant	Average High-3-in-10 year actual SO₂ emissions, tpy	Years	3-in-10 year actual SO₂ emissions used in modeling, tpy	Years	Allowable annual emissions under CD at 85% capacity factor, tpy	Factor above historical high-3-in-10 year actual SO₂ emissions	Factor above MDNR modeled emissions
Labadie	62,141	2008-2011	46,185	2011-2013	152,036	2.44	3.29
Meramec	21,419	2006-2008	10,259	2011-2013	27,442	1.28	2.67
Rush Island	27,996	2008-2010	22,682	2011-2013	50,633	2.23	2.23

In addition to EPA's concerns regarding the monitor-centric analysis (described above), EPA believes that MDNR's analysis and technical support document provided in the attainment plan lacks a demonstration that these significantly higher than normal levels of emissions from the AmerenUE facilities are protective of the 1-hour SO₂ NAAQS at any receptors in the Jefferson County nonattainment area.

Specifically in section 5.1a, MDNR states they used actual emissions in modeling for those sources outside the NAA, (mainly the large power plants), and used actual hourly emissions for those with CEM data. The attainment plan includes emissions limitations and monitoring requirements through the Consent Agreement for these sources. However, MDNR does not explain how the actual hourly emissions used for these sources relate to the new emissions limitations identified in the Consent Agreement.

For example, actual annual emissions from Meramec have decreased (see table below). This decrease in emissions was captured in the model using actual hourly values, however the record is not clear as to how the actual hourly rates used in the modeling relate to new emission limits imposed in the Consent Agreement. The Consent Agreement lists a 7,371 lbs/hr limit with a 24-hr block average for the Meramec facility-wide, which equates to a Potential To Emit (PTE) of 32,285 tons/yr. This limit is much higher than actual emissions (see table below) that MDNR used in the attainment modeling.

Additionally, MDNR modeled the two Rush Island units, which are located within the nonattainment area, using actual hourly emissions and not allowable emissions as specifically addressed in the April 23, 2014 EPA Guidance for 1-hour SO₂ nonattainment area SIP submissions which states, "The attainment plan for the affected area should also demonstrate, through the use of air quality dispersion modeling, using allowable emissions and supplemental analyses as appropriate, that the area will attain the standard by its attainment date. The attainment demonstration should also ensure that the area will attain the 2010 SO₂ NAAQS with a 3 year design value of no greater than 75 ppb throughout the entire nonattainment area by the

statutory attainment date, through the adoption and implementation, at a minimum, of emission control measures representing RACM/RACT.”

Ameren Missouri Meramec Energy Center SO₂ Emissions Trend	
Emission Year	SO₂ Emissions (Tons per Year)
2008	20,826
2009	16, 856
2010	17, 075
2011	15,281
2012	9,532
2013	5,962

In reviewing the hourly CEM emissions for Meramec it is observed that during 2011-2013, the period used in modeling and variability analysis by MDNR supporting the attainment plan, the maximum actual facility-wide hourly emissions was 7,557 lbs and at no time did the facility-wide 24 hour average emissions ever exceed the proposed 24 hour limit specified in the Consent Agreement. This indicates that the actual hourly rates used in modeling for demonstrating attainment were always lower than the limits imposed by the Consent Agreement and thus create the potential for NAAQS violations (e.g. the modeling does not demonstrate the NAAQS is protected as the rates modeled were always lower than that being allowed).

It is also important to note that out of the 26,304 hours modeled there were 14,412 hours (54.8% of the time) where one or more of the 4 Meramec Units were reporting zero SO₂ emissions which may not be the case in the future and thus MDNR modeling may be missing high impacts in the modeling they have performed. This same issue applies to other Ameren units modeled by MDNR, Rush Island – 6,294 hours and Labadie – 8,025 hours where at least one unit is not operating. Nothing in the Consent Agreement between MDNR and AmerenUE would require limiting the hours of operation where at least one unit was not operating at these facilities similar to the periods modeled by MDNR. Of additional note, EPA identified an error during its review of the hourly rates used in the actual emissions modeling for Labadie. The rates appear to be off by a factor of ~1.4, i.e. these units were modeled at a rate higher than what was actually emitted based on CEM data. While this may be somewhat more conservative for these units this approach still does not account for the potential hours where a unit was not operating or emitting and no explanation was provided by MDNR as to why this upward adjustment to the CEM emissions data was made or how it relates to the Consent Agreement rates.

In addition to the actual hourly emissions, these hourly CEM emissions were paired with meteorological data from a different period, and there is no explanation for this divergence from standard practice. MDNR does quote the designations modeling TAD section 7.4 where EPA proposes pairing hourly data with meteorological data from a different period, but cautions against using it for EGU's which may have emissions that are dependent on meteorology. Two issues exist here, first designations modeling, not nonattainment modeling, allows for actual emissions to be considered, and second EPA cautions against pairing older meteorology with emissions for this type of source. MDNR does note that emissions that occurred in the met

period of interest are no longer representative. For example, Ameren Meramec reported 20,826 tons of SO₂ in 2008, and 5,962 tons of SO₂ in 2013, however the rates in the Consent Agreement would allow for over 32,000 tons in future years from this facility and nothing in the agreement requires Meramec to only emit 5,962 tons/year in the future.

In this case EPA believes MDNR should have used a constant hourly rate, preferably based on enforceable allowable rates, following the EPA guidance for NAA modeling. At a minimum, EPA recommends that additional explanation in the record as to why the hourly rates modeled for these sources outside the nonattainment area are protective of the NAAQS in the entire nonattainment area is needed as it is not at all clear how the actual hourly rates modeled relate to the rates proposed in the Consent Agreement. This is especially true considering the numerous hours where units were not running.

In section 6.1, MDNR mentions a variability analysis being performed to inform the actual hourly emissions used in the modeling but this analysis was not included the appendices or the main text of the SIP and it was not clear how this could even be applied to the actual hourly emission used in the modeling demonstration. Following MDNR's release of the attainment plan for public comment, EPA requested and received this data from MDNR. EPA recommends that this data be included as part of the appendices, however, we note that a variability analysis for establishing a limit protective of the NAAQS only works with a worst case modeled rate evaluated over the entire area and could not be used with actual hourly emissions.

In section 6.1 and in Appendix J (Consent Agreement), the emission limits in the Consent Agreement with the Ameren sources are provided facility wide based on a 24hr block average; however, although the modeling accounts for varying stack parameters between units and thus potential varying concentration impacts, the Consent Agreement does not account for this. For example, Meramec Units 1 and 2 have different stack parameters than Units 3 and 4. By combining the limits facility wide in the consent agreement the source could effectively emit at a rate higher than that modeled for an individual unit that has a higher potential for impacts (i.e. lower stack heights). EPA recommends that the limits in the consent agreement should be unit by unit or grouped by like stacks assuming those stacks have the same potential impacts. In the alternative, MDNR should demonstrate that potential unit by unit variability of emissions that could occur under the facility wide limits would still be protective of the SO₂ NAAQS in the nonattainment area. EPA notes that, even for like units the modeled hourly rates were not always the same thus it may not be appropriate to combine the units in the consent agreement especially when the variability ratio is different between the units (example from MDNR shown below).

Plant-wide Total Meramec Energy Center					
Unit	Modeled (lb/hr)	1hr 99 th % (lb/hr)	24hr 99 th % (lb/hr)	Ratio	Block 24hr limit (lb/hr)
Unit 1	1250.0	991.9	857.8	0.864811	1081.0
Unit2	1250.0	949.4	867.1	0.913264	1141.6
Total (1&2)	2500.0	1941.3	1724.9	0.889037	2222.6
Unit 3	2600.0	1952.6	1812.9	0.928429	2413.9
Unit 4	3000.0	2679.2	2441.9	0.911426	2734.3
Total (3&4)	5600.0	4631.9	4254.8	0.919927	5148.2

Other Large Nearby SO₂ Sources

In the attainment plan submitted for public comment by MDNR, they note that certain sources outside the nonattainment area are also modeled at their actual rates. For example, a cement plant, which is located 1.0 mile south of the designated SO₂ nonattainment area boundary and a 3,500 ton SO₂ source approximately 14 miles upwind from the southern nonattainment boundary have allowable emission limits much higher than their actual rates,. EPA notes that, 40 CFR Part 51 Appendix W, table 8.1 requires sources, either within or outside the nonattainment area that are modeling a significant concentration gradient in the nonattainment area being analyzed to model at their allowable emission rate for purposes of a NAAQS demonstration. To properly support the attainment plan, EPA believes that MDNR should model these plants at their respective PSD allowable emission rates or provide sufficient justification that these sources are not modeling a significant concentration gradient in the nonattainment area in order to support varying from this requirement.

2018 Projected SO₂ Emissions

In Appendix C, on page 42 of the attachments, MDNR identifies expected 2018 SO₂ emissions from stationary sources in Jefferson County of 8,007 tons per year. However, SO₂ point source emissions from the 2011 emissions inventory for Jefferson County total 43,700 tons per year. Subtracting the emissions of the Doe Run Herculaneum plant reduces the 2011 emissions inventory to 28,467 tons per year. This information suggests that the draft plan submitted by MDNR is expected to reduce actual SO₂ by just over 20,000 tons per year in the nonattainment area from 2011 to 2018. However, the only “enforceable” controls proposed for Jefferson County are for the Rush Island plant, which by the terms of the Consent Agreement would allow the plant to increase their actual emissions up to 50,633 tons per year at an 85% capacity factor. As illustrated in Table 1 above, this is an approximate 23,000 ton per year increase for Rush Island alone, so it appears that the Appendix C 2018 emissions summary is incorrect.

Sincerely,



for Joshua Tapp
Chief,
Air Planning and Development Branch